THE LARVA AND TERRESTRIAL PUPA OF IRONOQUIA PARVULA (TRICHOPTERA, LIMNEPHILIDAE*

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The genus *Ironoquia* was erected in 1916 by Banks to receive *parvula*, originally described in 1900 in *Chaetopterygopsis*. *Ironoquia* remained monotypic until 1951 when Schmid united the four species of *Caborius* with it. The species was originally described from specimens collected in New Jersey and has since been recorded from Massachusetts and New Hampshire. The immature stages have remained undescribed until the present. In the summer of 1957 the species was reared from Ringwood Preserve in Dryden, New York.

LARVA: Length 11 mm., width 1.5 mm. Shape eruciform; color of sclerites deep brown, abdomen white.

HEAD: (fig. 1) Brown, paling slightly posteriorly and ventrally, with a pale band following the epicranial sutures. Muscle insertion marks dark, indistinct, noticeable only posterior to eye. Face densely spinulate; mouthparts typical of family.

THORAX: (fig. 2) Pronotum brown, with pale central band; a shallow transverse depression across anterior half. Mesonotum brown, with pale central band, posterior margin black. Metanotum with numerous short setae on membrane. Legs brown to straw. Prosternal horn sclerotized, not reaching apex of fore coxae.

ABDOMEN: Three spacing humps present, lateral ones much flattened. First segment dorsally with many short setae; lateral hump with scabrous patch apically; venter elevated transversely, with many long setae. Gills borne in bushy clusters of 12–15 branches. Oval sclerotized rings on venters of segments 3–8. Lateral line on anterior half of segment three composed of thick erect dark scales. Posterior margin of segment 8 dorsally with 8–10 long setae, and a varying number of short pale ones. Ninth segment chitin plate bearing 4 long black setae; one seta laterally of plate; another pair submedially on venter. Sclerite around anal claw with 13–15 setae; membranous ventral portion of prolegs with 3–7 setae.

PUPA: Length 7–8 mm., width 2 mm. Color white. General shape typical of family, fig. 3.

HEAD: Mandibles (fig. 4) curved, with 2 black setae externally. Labrum (fig. 5) with 3 black and 1 pale seta in each distal group; 2 long, straight,

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black setae and 1 short pale seta in each proximal group. Front with 2 pairs of setae, another pair near eyes, pair between bases of antennae, and last pair on occipital region. Antennae reaching apex of abdomen and curving up and around apical segments; each antenna with 2 long black setae on ventral side of first segment, 3 more dorsally; second segment with 2 long black setae.

Thorax: Pronotum with a pair of setae submedially. Mesonotum with 2 pairs of long dark setae, posterior pair with 1–2 small setae. Metanotum with a pair of long, and a pair of short setae near middle. Fore coxae with 3 setae ventrally, middle coxae with 1 seta; hind legs with a very feebly developed fringe.

Abdomen: Segments 1–5 dorsally with 2 pairs of setae, segment 6 with 3 pairs, segment 7 with 4 pairs, and segment 8 with 7–8 pairs. Segments 2–8 with dorsal and ventral sclerotized rods. Segments 2–7 ventrally with a postero-lateral seta, segment 8 with 2 setae. Segments 2–8 laterally with a subdorsal seta; segment 6 with a posterior seta, 7–8 with a cluster of fine hairs here, probably remnants of lateral fringe. First segment dorsally lacking posterior rugosity; hook plates (fig. 6) may have from 1–3 spines per anterior plate. Anal appendages (fig. 7) reduced to rounded lobes.

Case: Length 9–13 mm., width 2 mm. Slender, tapered and curved. Composed of small sand grains attached to give a very uniform surface.

The larvae will key to *Caborius* in Ross, from which they may be separated by the markings of the head. The larvae of *Caborius* and *Ironoquia* do seem to substantiate the union proposed by Schmid on the basis of adult characters. It will be interesting to see if the pupa of *Caborius* also substantiates this union.

The pupae can be separated from any known Nearctic limnephilid in that they lack anal processes, gills, etc.

Biology

The larvae were taken in a small kettle hole pool which contains water in the spring, but generally dries up in the summer. Larvae of *Limnephilus indivisus* Walk. are abundant in this pool, yet in a nearby swamp there *indivisus* is equally common not a single larva of *parvula* has been found. The larvae were abundant and conspicuous in May and June as they clambered over the submerged leaves and congregated by the dozens on the fallen inflorescences of *Acer rubrum.* Attempts were made to rear larvae in aquaria, but all attempts met with failure, the larvae dying in a few weeks for no apparent reason.

A trip to the pool on the rainy afternoon of June 20 showed the answer to the problem. A larva was observed out of the water crawling away from the pool. A search through the rotting leaves at the high water line yielded a number of larvae secreted under the leaves. During the summer, aestivating larvae were found under the leaves, even when the pool had completely dried up. These larvae were inactive and retracted in their cases, which were unsealed.

The mortality among the aestivating larvae must be very high. It appeared that only a particular set of conditions would allow completion of development. Those larvae which were unprotected from the rain were washed out of the leaves. Their whitened cases were strewn by the hundreds over many areas. In other places where there were still layers of unrotted leaves, few larvae or pupae were found. The most productive area was where the ground was shielded by the trees, and a vigorous growth of poison ivy, yet the leaves had rotted so that only the uppermost few were still intact. The pupae were found buried in these early in September. The anterior end of the case had been sealed by a silken mesh, whose many small openings allowed easy access of air. The substrate now was not greatly different from the surrounding forest litter.

While the larvae live in a typical environment, and do not differ greatly from related forms, the pupae are markedly different in habits and morphology. The following interesting features of the pupae may be pointed out: reduction of the distal bristle group of the labrum, lack of gills, reduction of lateral line, and reduction of anal appendages into rounded pads. In these respects the pupae agree closely with the European terrestrial species, *Enoicyla pusilla*.

In addition to the larvae from New York, I have a few from Amherst, Massachusetts, collected on May 6, 1953 by R. A. Allaire. The larvae are labelled Mill Stream, which, if I interpret correctly, is a slowly flowing, sandy bottom stream, about 2 yards wide by 6 inches to 3 feet deep. If this is correct, it represents a great difference in habitats in the two collections.

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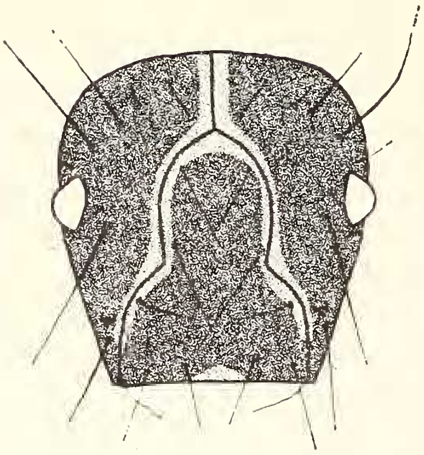
Ironoquia parvula (Bks.)



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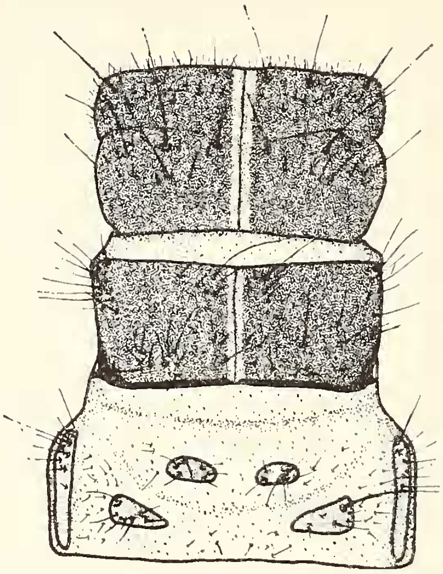

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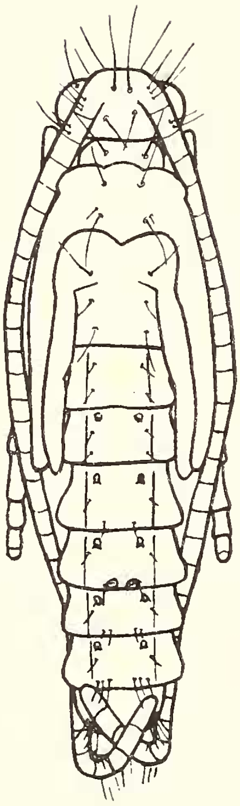

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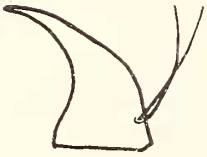

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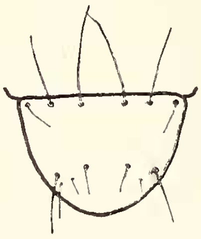

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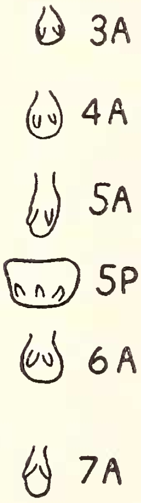

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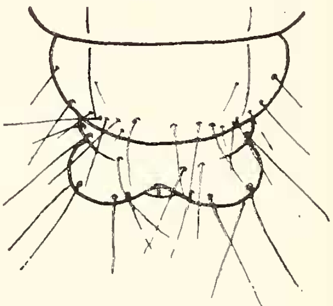

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Fig. 1. Larva, head. Fig. 2. Larva, thoracic nota. Fig. 3. Pupa. Fig. 4. Pupa, mandible. Fig. 5. Pupa, labrum. Fig. 6. Pupa, hook plates, A—anterior, P—posterior. Fig. 7. Pupa, apex of abdomen.